

Appl. No. 10/676,959
Amdt. Dated January 23, 2006
Reply to Office action of November 22, 2005

Amendments to the Drawings:

The attached sheet of drawings includes changes to Fig. 2C and Fig. 2E.

Attachment: Replacement Sheet
 Annotated Sheet Showing Changes

REMARKS/ARGUMENTS

Claims 1-10 are pending in the present application.

This Amendment is in response to the Office Action mailed November 22, 2005. In the Office Action, the Examiner objected to the Abstract of the Disclosure and the drawings, rejected claims 1-10 under 35 U.S.C. §103(a). Applicants have amended claims 1 and 9. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Drawings

The Examiner objected to the drawings due to minor informalities. In response, Applicant has amended the drawings accordingly as follows:

Figure 2C: Reference "236" is added to show the bumps of the die 235.

Figure 2E: Reference "130" is changed to "140".

Therefore, Applicants respectfully request the objection be withdrawn.

Specification

The Examiner objected to the specification due to minor informalities. In response, Applicant has amended the specification accordingly. Therefore, Applicants respectfully request the objection be withdrawn.

Claim Objections

The Examiner objects to claim 9 due to minor informalities. Applicants have amended claim 9 to correct the minor informalities. Accordingly, Applicants respectfully request that the Examiner withdraw the objection to claim 9.

Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1-10 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,988,485 issued to Master et al. ("Master") in view of U.S. Patent No. 6,854,633 issued to Grigg et al. ("Grigg"). Applicants respectfully traverse the rejection and contend that the Examiner has not met the burden of establishing a prima facie case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *MPEP §2143, p. 2100-129 (8th Ed., Rev. 2, May 2004)*. Applicants respectfully contend that there is no suggestion or motivation to combine their teachings, and thus no *prima facie* case of obviousness has been established.

Master discloses a flux cleaning for flip chip technology using environmentally friendly solvents. Fluxes commonly contain three constituents: a solvent, a vehicle, and an activator (Master, col. 4, lines 8-11). A reflow process consists of a preheat step where the solvent is vaporized (Master, col. 4, lines 12-14).

Grigg discloses a system with polymer masking flux for fabricating external contacts on semiconductor components. A polymer masking flux includes an electrically insulating polymer resin, a fluxing agent, and a curing agent (Grigg, col. 5, lines 40-67). A flux dispensing mechanism 68 dispenses a viscous polymer masking flux 70 onto contact pads 32 of a component 28 (Grigg, col. 7, lines 62-65).

Master and Grigg, taken alone or in any combination, do not disclose, suggest, or render obvious, at least one of (1) applying a flux on a substrate having solder bumps, the flux including at least a solvent and a water soluble monomer or a water soluble polymer; (2) placing a die on the substrate; (3) reflowing the die in a reflow device at a reflow temperature; (4) the reflow temperature having a temperature profile including an increasing region, an approximately constant region, and a decreasing region, (5) solidifying the solder joints at a decreasing reflow temperature and solidifying the polymer liquid to redistribute the stress, as recited in claim 8 (5) reacting the monomer to form solid polymer and melting the solid polymer into polymer liquid, as recited in claim 7.

Master merely discloses a flux containing a solvent, a vehicle, and an activator. The solvent is used to facilitate uniform spreading of the flux (Master, col. 4, lines 12-13). Therefore, Master does not disclose or suggest using a flux that contains a water soluble monomer or polymer to re-distribute the stress generated by CTE mismatch between the die and

the substrate. Grigg merely discloses a flux to be bonded to contact pads of a component (Grigg, col. 7, lines 62-65), not between solder bumps of a substrate and bumps on a die. The fluxing agent is used only to clean and remove oxides (Grigg, col. 5, lines 49-51). Therefore, it is not solidified to redistribute the stress. In addition, Grigg does not disclose reacting the monomer to form solid polymer and melting the solid polymer into polymer liquid. Furthermore, neither Master nor Grigg discloses a temperature profile including an increasing region, an approximately constant region, and a decreasing region. To clarify this aspect of the invention, claim 1 has been amended.

There is no motivation to combine Master and Grigg because neither of them addresses the problem of redistribution of stress caused by CTE mismatch between the substrate and the die. There is no teaching or suggestion that reacting the monomer to form solid polymer is present. Master, read as a whole, does not suggest the desirability of using a water soluble monomer or polymer. For the above reasons, the rejection under 35 U.S.C. §103(a) is improperly made.

The Examiner failed to establish a prima facie case of obviousness or a motivation to combine the references. When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Col, Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). “When determining the patentability of a claimed invention which combined two known elements, ‘the question is whether there is something in the prior art as a whole suggest the desirability, and thus the obviousness, of making the combination.’” In re Beattie, Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 730 F.2d 1452, 1462, 221 USPQ (BNA) 481, 488 (Fed. Cir. 1984). To defeat patentability based on obviousness, the suggestion to make the new product having the claimed characteristics must come from the prior art, not from the hindsight knowledge of the invention. Interconnect Planning Corp. v. Feil, 744 F.2d 1132, 1143, 227 USPQ (BNA) 543, 551 (Fed. Cir. 1985). To prevent the use of hindsight based on the invention

to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. In other words, the Examiner must show reasons that a skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the prior elements from the cited prior references for combination in the manner claimed. In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1996), 47 USPQ 2d (BNA) 1453. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973. (Bd.Pat.App.&Inter. 1985). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." In re Mills 916 F.2d at 682, 16 USPQ2d at 1432; In re Fitch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

In the present invention, the cited references do not expressly or implicitly suggest at least one of the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Master and Grigg is an obvious application of fluxes for flip chip assembly using water soluble monomers or polymers.

Therefore, Applicants believe that independent claim 1 and its respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §103(a) be withdrawn.

Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Dated: January 23, 2006

By


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Tu Nguyen

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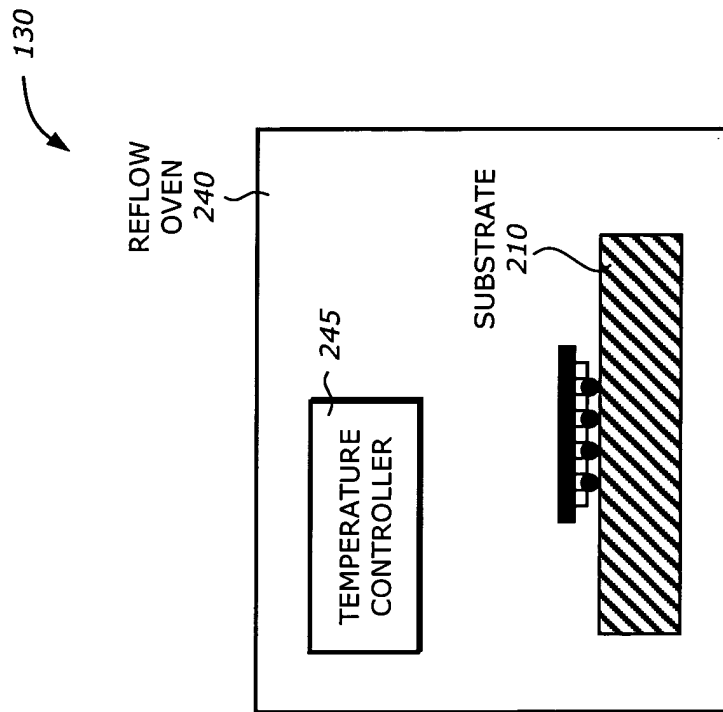


FIG. 2D

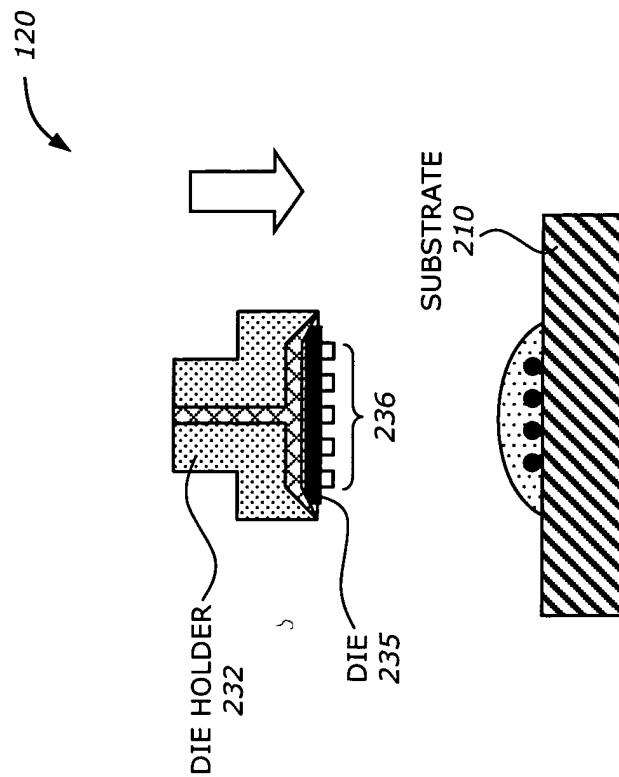


FIG. 2C

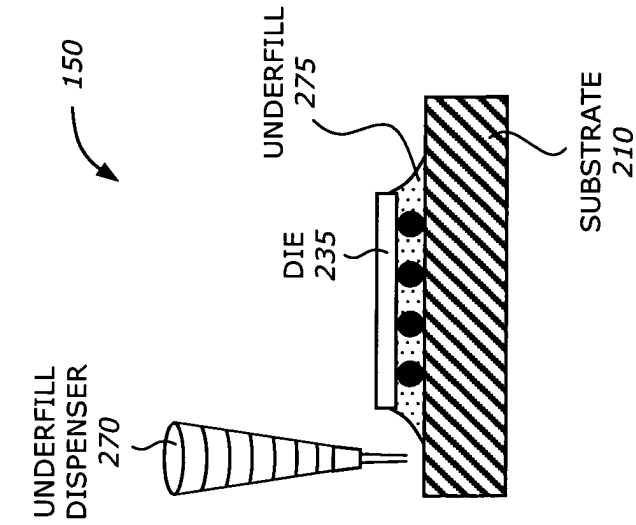


FIG. 2F

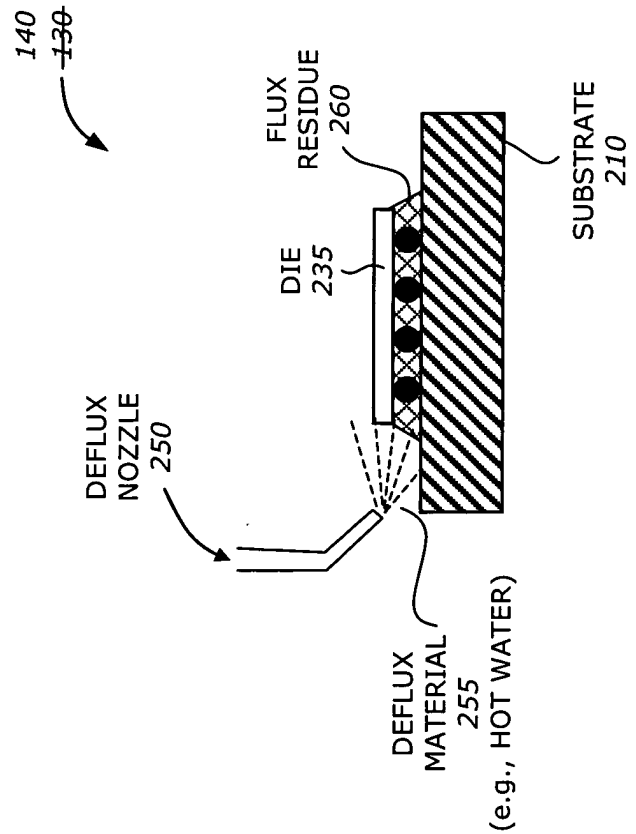


FIG. 2E